

WHAT IS CLAIMED IS:

1. A method for preparing grains of silver salt of an organic acid by reacting a solution containing silver ions and a solution containing an alkali metal salt of an organic acid, in which the reaction is performed in sealed mixing means and which comprises steps of supplying the solution containing silver ions into a reaction field solution before introduced into the sealed mixing means, and supplying the solution containing an alkali metal salt of an organic acid into the reaction field solution or sealed mixing means to which the solution containing silver ions has been supplied.

2. A method for preparing grains of silver salt of an organic acid according to Claim 1, wherein Reynolds number of the solution containing silver ions is in the range of 500-20000 when the solution containing silver ions is supplied to the reaction field solution.

3. A method for preparing grains of silver salt of an organic acid by reacting a solution containing silver ions and a solution containing an alkali metal salt of an organic acid, which comprises steps of mixing the solution containing silver ions and the solution containing an alkali metal salt of an organic acid to conduct a reaction in sealed mixing means and removing by-product salts contained in the reaction mixture by filtration through an ultrafiltration membrane during or after the reaction.

4. A method for preparing grains of silver salt of an organic acid according to Claim 3, wherein at least a part of a mixture obtained after the reaction of the

solution containing silver ions and the solution containing an alkali metal salt of an organic acid mixed in the sealed mixing means is circulated and returned to the sealed mixing means.

5. A method for preparing grains of silver salt of an organic acid according to Claim 3, wherein at least one kind of dispersing agent is added before starting the reaction or before finishing the purification utilizing an ultrafiltration membrane.

6. A method for preparing grains of silver salt of an organic acid according to Claim 5, wherein a nonionic macromolecular dispersing agent having a molecular weight 5-50 times larger than a fractional molecular weight of the ultrafiltration membrane is used as the dispersing agent.

7. A method for preparing grains of silver salt of an organic acid according to Claim 6, wherein the nonionic macromolecular dispersing agent is used at a concentration of 0.1-30 weight % of solid content of the silver salt of an organic acid.

8. A method for preparing grains of silver salt of an organic acid according to Claim 5, wherein at least one of polyvinyl alcohol, polyvinylpyrrolidone, hydroxyethyl cellulose and hydroxypropyl cellulose is used as the dispersing agent.

9. A method for preparing grains of silver salt of an organic acid according to Claim 3, wherein the by-product salts are removed by ultrafiltration in which 2- to 20-fold constant volume dilution is attained, and

then the dispersion is concentrated to a concentration of 10-50 weight %.

10. A method for preparing an aqueous dispersion of grains of silver salt of an organic acid, wherein grains of silver salt of an organic acid are prepared by reacting a solution containing silver ions and a solution containing an alkali metal salt of an organic acid, then dispersion operation is performed by a high pressure homogenizer or high speed rotary homomixer in the presence of a dispersing agent, and by-product salts are removed by ultrafiltration after or during the dispersion operation.

11. A method for preparing an aqueous dispersion of grains of silver salt of an organic acid according to Claim 10, wherein the dispersing agent is used at a concentration of 1-30 weight % of dispersoid.

12. A method for preparing an aqueous dispersion of grains of silver salt of an organic acid according to Claim 10, wherein concentration of the grains of silver salt of an organic acid is 1-10 weight % immediately after the reaction.

13. A method for preparing an aqueous dispersion of grains of silver salt of an organic acid according to Claim 10, wherein, after the by-product salts are removed by the ultrafiltration, concentration operation is performed by the ultrafiltration.

14. A method for preparing an aqueous dispersion of grains of silver salt of an organic acid according to Claim 10, wherein, after electric conductivity

reached within the range of from 20  $\mu\text{S}/\text{cm}$  to less than 300  $\mu\text{S}/\text{cm}$  as a result of the removal of the by-product salts by the ultrafiltration, the dispersion is concentrated to a concentration of 10-70 weight % by the ultrafiltration.

15. An apparatus for preparing grains of silver salt of an organic acid, which comprises:

first supplying means for supplying a solution containing silver ions to sealed mixing means;

second supplying means for supplying a solution containing an alkali metal salt of an organic acid to the sealed mixing means;

third supplying means for supplying a reaction field solution to the sealed mixing means;

the sealed mixing means for mixing materials supplied from the first, second and third supplying means to form a dispersion containing grains of silver salt of an organic acid;

storage means for the formed dispersion containing grains of silver salt of an organic acid from the sealed mixing means;

fourth supplying means for supplying the dispersion containing grains of silver salt of an organic acid in the storage means from the storage means to an ultrafiltration process; and

purification means for removing by-product salts from the dispersion containing grains of silver salt of an organic acid by ultrafiltration.

16. An apparatus for preparing grains of silver salt of an organic acid, which comprises:

first supplying means for supplying a solution containing silver ions to sealed mixing means;

second supplying means for supplying a solution containing an alkali metal salt of an organic acid to the sealed mixing means;

the sealed mixing means for mixing materials supplied from the first and second supplying means and third supplying means mentioned below to form a dispersion containing grains of silver salt of an organic acid;

storage means for the formed dispersion containing grains of silver salt of an organic acid from the sealed mixing means;

third supplying means for supplying at least a part of the formed dispersion containing grains of silver salt of an organic acid to the sealed mixing means again;

fourth supplying means for supplying the dispersion containing grains of silver salt of an organic acid in the storage means from the storage means to an ultrafiltration process; and

purification means for removing by-product salts from the dispersion containing grains of silver salt of an organic acid by ultrafiltration.

17. An apparatus for preparing grains of silver salt of an organic acid, which comprises a pipeline for supplying a solution containing silver ions, a pipeline for supplying a solution containing an alkali metal salt of an organic acid, sealed mixing means and a pipeline for supplying a reaction field solution to the sealed mixing means, wherein the pipeline for supplying a solution containing silver ions is connected to the pipeline for supplying a reaction field solution, and the pipeline for supplying a solution containing an alkali metal salt of an organic acid is connected to

the sealed mixing means or the pipeline for supplying a reaction field solution at a position between a position at which the pipeline for supplying a solution containing silver ions is connected and the sealed mixing means.

18. An apparatus for preparing grains of silver salt of an organic acid, which comprises a pipeline for supplying a solution containing silver ions, a pipeline for supplying a solution containing an alkali metal salt of an organic acid, first sealed mixing means, second sealed mixing means, a pipeline for connecting the first sealed mixing means and the second sealed mixing means and a pipeline for supplying a reaction field solution to the first sealed mixing means, wherein the pipeline for supplying a solution containing silver ions is connected to the pipeline for supplying a reaction field solution to the first sealed mixing means or the first sealed mixing means, and the pipeline for supplying a solution containing an alkali metal salt of an organic acid is connected to the pipeline for connecting the first sealed mixing means and second sealed mixing means or the second sealed mixing means.

19. A method for producing a thermally processed image recording material comprising a silver salt of an organic acid, a reducing agent for silver ions and a binder on at least one surface of a support, which comprises a step of applying a coating solution for image-forming layer containing an aqueous dispersion of grains of silver salt of an organic acid prepared by the preparation method according to Claim 1.

20. A method for producing a thermally processed image recording material comprising a silver salt of an organic acid, a reducing agent for silver ions and a binder on at least one surface of a support, which comprises a step of applying a coating solution for image-forming layer containing an aqueous dispersion of grains of silver salt of an organic acid prepared by the preparation method according to Claim 3.

21. A method for producing a thermally processed image recording material comprising a silver salt of an organic acid, a reducing agent for silver ions and a binder on at least one surface of a support, which comprises a step of applying a coating solution for image-forming layer containing an aqueous dispersion of grains of silver salt of an organic acid prepared by the preparation method according to Claim 10.

22. A method for producing a thermally processed image recording material according to Claim 21, wherein the coating solution for image-forming layer contains a photosensitive silver halide and a polymer showing an equilibrated moisture content of 2 weight % or less at 25°C and relative humidity of 60% in the form of latex as the binder, and 30 weight % or more of the solvent of the coating solution consists of water.

23. An apparatus for preparing a dispersion containing grains of silver salt of an organic acid, which comprises:

first supplying means for supplying a solution containing silver ions to sealed mixing means;

second supplying means for supplying a solution containing an alkali metal salt of an organic acid to

the sealed mixing means;

third supplying means for supplying a reaction field solution to the sealed mixing means;

the sealed mixing means for mixing materials supplied from the first, second and third supplying means to form a dispersion containing grains of silver salt of an organic acid;

storage means for the formed dispersion containing grains of silver salt of an organic acid from the sealed mixing means;

fourth supplying means for supplying the dispersion containing grains of silver salt of an organic acid from the storage means to an ultrafiltration process; and

purification means for removing by-product salts from the dispersion containing grains of silver salt of an organic acid by ultrafiltration.

24. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 23, wherein a pipeline for supplying a solution containing silver ions for the first supplying means is connected to a pipeline for supplying a reaction field solution for the third supplying means.

25. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 23, wherein a pipeline for supplying a solution containing an alkali metal salt of an organic acid for the second supplying means is connected to the sealed mixing means or a pipeline for supplying a reaction field solution for the third supplying means at a position between a position at



which a pipeline for supplying a solution containing silver ions for the first supplying means is connected and the sealed mixing means.

26. An apparatus for preparing a dispersion containing grains of silver salt of an organic acid, which comprises:

first supplying means for supplying a solution containing silver ions to sealed mixing means;

second supplying means for supplying a solution containing an alkali metal salt of an organic acid to the sealed mixing means;

the sealed mixing means for mixing materials supplied from the first and second supplying means and third supplying means mentioned below to form a dispersion containing grains of silver salt of an organic acid;

storage means for the formed dispersion containing grains of silver salt of an organic acid from the sealed mixing means;

third supplying means for supplying at least a part of the formed dispersion containing grains of silver salt of an organic acid to the sealed mixing means;

fourth supplying means for supplying the dispersion containing grains of silver salt of an organic acid from the storage means to an ultrafiltration process; and

purification means for removing by-product salts from the dispersion containing grains of silver salt of an organic acid by ultrafiltration.

27. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid

according to Claim 26, wherein a pipeline for supplying a solution containing silver ions for the first supplying means is connected to a pipeline for supplying a reaction field solution for the third supplying means.

28. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 26, wherein a pipeline for supplying a solution containing an alkali metal salt of an organic acid for the second supplying means is connected to the sealed mixing means or a pipeline for supplying a reaction field solution for the third supplying means at a position between a position at which a pipeline for supplying a solution containing silver ions for the first supplying means is connected and the sealed mixing means.

29. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 26, which further comprises a fifth supplying means for supplying the dispersion after ultrafiltration from the purification means to the storage means.

30. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 26, which further comprises a sixth supplying means for supplying water to the storage means.

31. An apparatus for preparing a dispersion containing grains of silver salt of an organic acid, which comprises:

first supplying means for supplying a solution containing silver ions to sealed mixing means;

second supplying means for supplying a solution containing an alkali metal salt of an organic acid to the sealed mixing means;

the sealed mixing means for mixing materials supplied from the first and second supplying means and third supplying means mentioned below to form a dispersion containing grains of silver salt of an organic acid;

first storage means for the formed dispersion containing grains of silver salt of an organic acid from the sealed mixing means;

third supplying means for supplying at least a part of the formed dispersion containing grains of silver salt of an organic acid to the sealed mixing means;

fourth supplying means for supplying the dispersion containing grains of silver salt of an organic acid from the first storage means to second storage means;

fifth supplying means for supplying the dispersion containing grains of silver salt of an organic acid from the second storage means to an ultrafiltration process; and

purification means for removing by-product salts from the dispersion containing grains of silver salt of an organic acid by ultrafiltration.

32. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 31, wherein a pipeline for supplying a solution containing silver ions for the first supplying means is connected to a pipeline for

supplying a reaction field solution for the third supplying means.

33. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 31, wherein a pipeline for supplying a solution containing an alkali metal salt of an organic acid for the second supplying means is connected to the sealed mixing means or a pipeline for supplying a reaction field solution for the third supplying means at a position between a position at which a pipeline for supplying a solution containing silver ions for the first supplying means is connected and the sealed mixing means.

34. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 31, which further comprises a sixth supplying means for supplying the dispersion after ultrafiltration from the purification means to the second storage means.

35. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 31, which further comprises a seventh supplying means for supplying water to the second storage means.

36. An apparatus for preparing a dispersion containing grains of silver salt of an organic acid, which comprises:

first supplying means for supplying a solution containing silver ions to sealed mixing means;

second supplying means for supplying a solution

containing an alkali metal salt of an organic acid to the sealed mixing means;

the sealed mixing means for mixing materials supplied from the first and second supplying means and third supplying means mentioned below to form a dispersion containing grains of silver salt of an organic acid;

storage means for the formed dispersion containing grains of silver salt of an organic acid from the sealed mixing means; and

third supplying means for supplying the formed dispersion containing grains of silver salt of an organic acid to the sealed mixing means.

37. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 36, wherein a pipeline for supplying a solution containing silver ions for the first supplying means is connected to a pipeline for supplying a reaction field solution for the third supplying means.

38. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 36, wherein a pipeline for supplying a solution containing an alkali metal salt of an organic acid for the second supplying means is connected to the sealed mixing means or a pipeline for supplying a reaction field solution for the third supplying means at a position between a position at which a pipeline for supplying a solution containing silver ions for the first supplying means is connected and the sealed mixing means.

39. The apparatus for preparing a dispersion containing grains of silver salt of an organic acid according to Claim 36, wherein the formed dispersion containing grains of silver salt of an organic acid is fed from the sealed mixing means to the storage means via a heat exchanger.

40. An apparatus for preparing a dispersion containing grains of silver salt of an organic acid, which comprises a pipeline for supplying a solution containing silver ions, a pipeline for supplying a solution containing an alkali metal salt of an organic acid, sealed mixing means and a pipeline for supplying a reaction field solution to the sealed mixing means, wherein the pipeline for supplying a solution containing silver ions is connected to the pipeline for supplying a reaction field solution, and the pipeline for supplying a solution containing an alkali metal salt of an organic acid is connected to the sealed mixing means or the pipeline for supplying a reaction field solution at a position between a position at which the pipeline for supplying a solution containing silver ions is connected and the sealed mixing means.

41. An apparatus for preparing a dispersion containing grains of silver salt of an organic acid, which comprises sealed mixing means, a pipeline for supplying a solution containing silver ions to the sealed mixing means, a pipeline for supplying a solution containing an alkali metal salt of an organic acid to the sealed mixing means, and a pipeline for supplying a reaction field solution to the sealed mixing means.

42. An apparatus for preparing a dispersion containing grains of silver salt of an organic acid, which comprises a pipeline for supplying a solution containing silver ions, a pipeline for supplying a solution containing an alkali metal salt of an organic acid, first sealed mixing means, second sealed mixing means, a pipeline for connecting the first sealed mixing means and the second sealed mixing means and a pipeline for supplying a reaction field solution to the first sealed mixing means, wherein the pipeline for supplying a solution containing silver ions is connected to the pipeline for supplying a reaction field solution to the first sealed mixing means or the first sealed mixing means, and the pipeline for supplying a solution containing an alkali metal salt of an organic acid is connected to the pipeline for connecting the first sealed mixing means and second sealed mixing means or the second sealed mixing means.